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Supplemental Material

Appendix A. Classification of reason for admission

Chapter Number	ICD-10-CA Chapter Title	Code Range
I	Certain infectious and parasitic diseases	A00–B99
II	Neoplasms	C00–D48
III	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	D50–D89
IV	Endocrine, nutritional and metabolic diseases	E00–E90
V	Mental and behavioural disorders	F00–F99
VI	Diseases of the nervous system	G00–G99
VII	Diseases of the eye and adnexa	H00–H59
VIII	Diseases of the ear and mastoid process	H60–H95
IX	Diseases of the circulatory system	I00–I99
X	Diseases of the respiratory system	J00–J99
XI	Diseases of the digestive system	K00–K93
XII	Diseases of the skin and subcutaneous tissue	L00–L99
XIII	Diseases of the musculoskeletal system and connective tissue	M00–M99
XIV	Diseases of the genitourinary system	N00–N99
XV	Pregnancy, childbirth and the puerperium	O00–O99
XVI	Certain conditions originating in the perinatal period	P00–P96
XVII	Congenital malformations, deformations, and chromosomal abnormalities	Q00–Q99
XVIII	Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified	R00–R99
XIX	Injury, poisoning and certain other consequences of external causes	S00–T98
XX	External causes of morbidity and mortality	V01–Y98
XXI	Factors influencing health status and contact with health services	Z01–Z99
XXII	Morphology of Neoplasms	8000/0-9989/1
XXIII	Provisional codes for research and temporary assignment	U00–U99

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Appendix B. Example for HAC group and subgroup classification using ICD 10 codes

Group	Subgroups	ICD 10 CA Codes
A: Infections	A_2: Central nervous system(meningitis, brain abscess, encephalitis), intracranial phlebitis	<p>G002: Streptococcal meningitis Includes: Non-pneumococcal, streptococci (Streptococcus, Group A) (Streptococcus, Group B)</p> <p>G008: Other bacterial meningitis Includes: Meningitis due to: Escherichia coli, Friedlander bacillus, Klebsiella</p> <p>G009: Bacterial meningitis, unspecified Includes: Meningitis: purulent NOS, pyogenic NOS. suppurative NOS</p> <p>G030: Non-pyogenic meningitis Includes: Nonbacterial meningitis</p> <p>G039: Meningitis, unspecified Includes: Arachnoiditis (spinal) NOS</p> <p>G048: Other encephalitis, myelitis and encephalomyelitis Includes: Post-infectious encephalitis and encephalomyelitis NOS</p> <p>G049: myelitis and encephalomyelitis, unspecified Includes: Ventriculitis (cerebral) NOS</p> <p>G060: Intracranial abscess and granuloma Includes: Abscess (embolic)(of): brain [any part], cerebellar, cerebral, otogenic, Intracranial abscess or granuloma: epidural, extradural, subdural</p> <p>G061: Intra-spinal abscess and granuloma Includes: Abscess (embolic) of spinal cord [any part]Intra-spinal abscess or granuloma: epidural, extradural subdural</p> <p>G062: Extradural and subdural abscess, unspecified</p> <p>D432: G08 C760 A858 D352 A178 D320 A879 G062 B004 C700 G008 G040 C793 G060 G061 G003 G049 A170 G042</p>

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Appendix C

PPC Description

- 01 Stroke & Intracranial Hemorrhage
- 02 Extreme CNS Complications
- 03 Acute Pulmonary Edema and Respiratory Failure without Ventilation
- 04 Acute Pulmonary Edema and Respiratory Failure with Ventilation
- 05 Pneumonia & Other Lung Infections
- 06 Aspiration Pneumonia
- 07 Pulmonary Embolism
- 08 Other Pulmonary Complications
- 09 Shock
- 10 Congestive Heart Failure
- 11 Acute Myocardial Infarction
- 12 Cardiac Arrhythmias & Conduction Disturbances
- 13 Other Cardiac Complications
- 14 Ventricular Fibrillation/Cardiac Arrest
- 15 Peripheral Vascular Complications Except Venous Thrombosis
- 16 Venous Thrombosis
- 17 Major Gastrointestinal Complications without Transfusion or Significant Bleeding
- 18 Major Gastrointestinal Complications with Transfusion or Significant Bleeding
- 19 Major Liver Complications
- 20 Other Gastrointestinal Complications without Transfusion or Significant Bleeding
- 21 Clostridium Difficile Colitis
- 22 Urinary Tract Infection
- 23 GU Complications Except UTI
- 24 Renal Failure without Dialysis
- 25 Renal Failure with Dialysis
- 26 Diabetic Ketoacidosis & Coma
- 27 Post-Hemorrhagic & Other Acute Anemia with Transfusion
- 28 In-Hospital Trauma and Fractures
- 29 Poisonings Except from Anesthesia
- 30 Poisonings due to Anesthesia
- 31 Decubitus Ulcer
- 32 Transfusion Incompatibility Reaction
- 33 Cellulitis
- 34 Moderate Infections
- 35 Septicemia & Severe Infections
- 36 Acute Mental Health Changes
- 37 Post-Operative Infection & Deep Wound Disruption without Procedure
- 38 Post-Operative Wound Infection & Deep Wound Disruption with Procedure
- 39 Reopening Surgical Site

- 40 Post-Operative Hemorrhage & Hematoma without Hemorrhage Control Procedure or I&D Procedure
- 41 Post-Operative Hemorrhage & Hematoma with Hemorrhage Control Procedure or I&D Procedure
- 42 Accidental Puncture/Laceration During Invasive Procedure

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- 43 Accidental Cut or Hemorrhage During Other Medical Care
- 44 Other Surgical Complication - Moderate
- 45 Post-procedure Foreign Bodies
- 46 Post-Operative Substance Reaction & Non-O.R. Procedure for Foreign Body
- 47 Encephalopathy
- 48 Other Complications of Medical Care
- 49 Iatrogenic Pneumothrax
- 50 Mechanical Complication of Device, Implant & Graft
- 51 Gastrointestinal Ostomy Complications
- 52 Inflammation & Other Complications of Devices, Implants or Grafts Except Vascular Infection
- 53 Infection, Inflammation and Clotting Complications of Peripheral Vascular Catheters and Infusions
- 54 Infections due to Central Venous Catheters
- 55 Obstetrical Hemorrhage without Transfusion
- 56 Obstetrical Hemorrhage with Transfusion
- 57 Obstetric Lacerations & Other Trauma without Instrumentation
- 58 Obstetric Lacerations & Other Trauma with Instrumentation
- 59 Medical & Anesthesia Obstetric Complications
- 60 Major Puerperal Infection and Other Major Obstetric Complications
- 61 Other Complications of Obstetrical Surgical & Perineal Wounds
- 62 Delivery with Placental Complications
- 63 Post-Operative Respiratory Failure with Tracheostomy
- 64 Other In-Hospital Adverse Events

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Appendix D. Potentially preventable HAC in patients with CKD

Complications	Description	N of cases	%
A: Infections	A_3: Respiratory (pneumonia, mediastinitis, pulmonary abscess ...)	455	4
	A_5: Genitourinary infection (UTI, cystitis, pyelonephritis ...)	481	4
B: Electrolyte imbalance	B_3: Acid-base, fluid, and electrolyte balance, metabolic disorders	493	4
D: Cardiovascular complications	D_4: Acute myocardial infarction	449	4
	D_16: Post procedural complications	542	4
E: Respiratory complications	E_6: Post procedural disorders (Pneumothorax included)	528	4
M: Hematologic complications	M_4: Anemia due to bleeding	494	4
P: Surgical medical complications	P_2: Other complications of surgical and medical care , not elsewhere classified	439	4
Others		3939	50
Potentially preventable complications		7820	63.11
Total recorded complications (HACs)		12126	100

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Appendix E. Association of outcomes in patients with CKD with all HACs

	Index hospitalization Mortality ^A (95% CI)	Discharge to 90-day Mortality ^A (95% CI)	Incremental LOS(days) ^B (median) (95% CI)	90-days re-admission ^A (95% CI)
≥ 1 Potentially preventable HACs	5.28(4.79 – 5.82)	1.37 (1.22 – 1.53)	14.32 (13.81 – 14.83)	1.27 (1.19 – 1.35)
One	3.55 (3.13 – 4.03)	1.40 (1.21 – 1.61)	9.31 (8.67 – 9.96)	1.21 (1.11 – 1.31)
2-3	6.26 (5.42 – 7.24)	1.34 (1.11 – 1.62)	16.12 (15.24 – 17.00)	1.34 (1.21 – 1.49)
4-5	14.86 (11.85 – 18.64)	1.04 (0.71 – 1.53) *	24.05 (22.39 – 25.71)	1.37 (1.12 – 1.67)
>5	17.40 (13.15 – 23.03)	1.71 (1.15 – 2.53)	42.91 (40.88 – 44.94)	1.50 (1.18 – 1.90)

A. Fully adjusted for age, admission type (elective vs urgent), gender, LOS, severity of CKD, non-preventable complications, and 16 comorbid conditions.

B. Fully adjusted for age, admission type (elective vs urgent), gender, severity of CKD, non-preventable complications, and 16 comorbid condition.

- Reference; admissions without HAC

*Non-significant

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Appendix F. Association of outcomes in patients with CKD with potentially preventable HACs by severity of CKD

CKD Severity	Mortality: Index hospitalization ^A (95% CI)	Mortality: Discharge to 90-days ^A (95% CI)	Length of stay ^B (mean) (95% CI)	Re-Admission Discharge to 90-days ^A (95% CI)
Moderate	4.81 (4.09 – 5.67)	1.06 (0.81 – 1.31) *	9.86 (8.91 – 10.32)	1.32 (1.20 – 1.43)
High	4.51 (3.71 – 5.46)	1.32 (1.04 – 1.69)	10.24 (8.87 – 11.61)	1.15 (1.00 – 1.32)
Very high	4.81 (3.76 – 6.13)	0.84 (0.61 – 1.15) *	10.23 (8.54 – 11.91)	1.12 (0.94 – 1.35) *

A. Fully adjusted for age, admission type (elective vs urgent), gender, LOS, severity of CKD, non-preventable complications, and 17 comorbid conditions

B. Fully adjusted for age, admission type (elective vs urgent), gender, severity of CKD, non-preventable complications, and 17 comorbid condition; Comorbid conditions: cancer, cerebrovascular disease, congestive heart failure, COPD, dementia, diabetes with complications, diabetes with NO complications, HIV/AIDS, metastatic solid tumor, myocardial infarction, mild liver disease, moderate/severe liver disease, para/hemiplegia, peptic ulcer disease, peripheral vascular diseases, rheumatologic diseases

- Reference; admissions without HAC

*Non-significant